

for example a transparent resin. The display comprises first conductive layer 2, spacer 4, second conductive layer 6, glass substrate 14, as well as display device 16. With display 40 it is possible to show a user interface to a user of the mobile phone 30. For example, the user interface may show digits and buttons for dialing a certain number. Other user interfaces, for example for showing an MP3 play list, for browsing through menus, for internet browsing, address book browsing, calendar browsing, messaging services and the like may be displayed on display 40. The user may operate the display 40 by touching the display at positions of buttons or sliders. By touching display 40, CPU 34 may receive information about the usage of the mobile phone 30 and operate the mobile phone 30 accordingly. Display driver 36 may supply user interfaces to display 40 depending on the operation of the user. From memory 32, the user interfaces may be loaded and displayed on display 40. Upon selecting setting up a phone call, or setting up other communication links, CPU 34 may instruct communication unit 38 to establish such a connection.

[0082] The operation of a mobile phone 30 as illustrated in FIG. 5 is shown in FIGS. 6-8.

[0083] Display driver 36 drives display 40 such that the first conductive layer 2 is provided 42 with a static potential, as described in conjunction with FIG. 3. Further, second conductive layer 6 is provided 44 with a pulsating potential being switched between the electrodes 12, as described in FIGS. 3 and 4.

[0084] Then it is sensed 46 if the first conductive layer 2 is pressed onto second conductive layer 6. Depending on the force the first conductive layer 2 is pressed onto a second conductive layer 6, the point of contact grows in its size and the current in second electrode 10 increases. If the force by which the layers 2, 6 are pressed together, i.e. the sensed current in electrode 10, is below a certain threshold 46a, the sensing 46 is continued.

[0085] Else, if the current increase above a certain threshold level 46b, the user interface is activated 48. By this, it is possible, to use force sensing to activate the user interface. When the display 40 is only gently touched, the force is not sufficient to let the current through second electrode 10 grow above the threshold level.

[0086] FIG. 7 illustrates a method according to a further embodiment.

[0087] After providing 42, 44 static and pulsating potential the first conductive layer 2 is used for capacitive touch detection. It is measured 50, whether a conductive piece approaches the first conductive layer 2, thus incurring a current through electrodes 8. If a conductive piece is detected in the proximity of the layer 2, the user interface provided by display driver 46 on display 40 is optimized for finger use. For example, using the finger is not as accurate as using a stylus pen. Touch buttons may be increased in size. Further, it may be possible to show slide bars, for sliding through an MP3 list or other content. After optimizing 52 the user interface for capacitive touch detection, the user interface may be operated 54 with finger input.

[0088] While the user interface is operated according to finger use, it is constantly sensed 56, whether pressure is applied onto the display 40, by measuring the current in second electrode 10. If the current in second electrode 10 is below 56a a certain threshold, the user interface stays in its state. Else, if the sensed pressure 56 is above 56b a certain threshold, i.e. the size of point of contact between the first

conductive layer 2 and the second conductive layer 6 is increased by increased pressure and thus the current through electrodes 10 is increased, the resistive touch detection is activated 58.

[0089] Upon resistive touch detection, the user interface is optimized 60 for touch detection by display driver 36. This may be the case, when the user switches from finger operation to stylus operation. A stylus pen allows more precise selecting certain buttons and content within display 40, thus, the user interface may be smaller and comprised more selectable items.

[0090] Further to optimizing 60 the user interface for resistive touch detection, the capacitive touch detection is turned off 62. This prevents the capacitive touch detection from interfering with the resistive touch detection.

[0091] During resistive touch detection, the position 24b is sensed 64 continuously, as described in conjunction with FIG. 3 and FIG. 4.

[0092] While in resistive touch detection mode, it is continuously sensed 66, whether the first conductive layer 2 is still in contact with the second conductive layer 6. If the first conductive layer 2 is disconnected for only a short time 66a, it is assumed that the resistive touch detection mode may still be kept operative. When the time of disconnecting the first conductive layer 2 from the second conductive layer 6 increases above a certain threshold 66b, it is determined that resistive touch detection mode shall deactivated.

[0093] The resistive touch detection is switched off 68, the capacitive touch detection is turned on again and it is again sensed 50, whether a conductive piece comes in the proximity of the first conductive layer 2.

[0094] FIG. 8 illustrates a further operation according to embodiments. When a phone call is received 70 in mobile phone 30 by communication unit 38, it is sensed 70, whether the user just swipes its hand over the display 40 or touches the display 40. When the user swipes his hand over display 40, the capacitive touch detection senses a conductive piece in proximity of conductive layer 2, which may be interpreted as rejecting a call 78. Else, if the user actively presses onto first conductive layer 2 bringing it into contact with second conductive layer 6, resistive touch detection is activated. It may be interpreted as answering the phone 74. When answering the phone 74, it is assumed that the user moves the phone 30 to its ear. For this reason, the capacitive touch detection is deactivated 76 in order to prevent the user from selecting certain items on the user interface unintentionally with his ear.

[0095] Further operation methods are possible and within the subject matter of the application. By combining capacitive and resistive touch detection with only one additional wire, it is possible to increase the use cases with only little changes to the drivers 18, 20. The touch detection according to the embodiments is more durable than known touch detections. Further, the touch detection may be operated using standard controllers, as well as dedicated ASICs. It is further possible to detect, whether the display 40 is touched with a finger or a stylus pen, as when the finger touches the display, the capacitive touch detection detects a conductive piece in its proximity, whereas when a stylus touches the surface of the display 40, capacitive measurement does not detect it. Thus, pen and finger use can be easily distinguished from each other. The apparatus and methods according to embodiments increases the usability of touch sensors.